USER GUIDE

SubSkills NET 3.5

submarine skills-training network applications

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1. INTRODUCTION

The Submarine Skills-training Network (SubSkillsNet) provides configurable training for individuals, sub-teams and teams. SubSkillsNet consists of an integrated system of simulations that meet a variety of training objectives (e.g. contact coordination, navigation, piloting, tactical plotting, navigation plotting, and sonar operation). This user manual explains network setup and how to use SubSkillsNet products. Most products can run either as a stand-alone trainer or networked with other SubSkillsNet trainers (radar, fire control, bridge view, periscope, and others) to allow submarine team training on board and in schoolhouse training laboratories. SubSkillsNet can also be networked to the CBOT and SBOT trainers developed by NUWC Newport and to EWPro. When individual products are networked with other trainers, they can be used to improve communication skills such as providing recommendations for maneuvers.

2. INSTALLING SUBSKILLSNET

The setup program starts automatically when the SubSkillsNet distribution CD is inserted (if Autorun is enabled.) Alternately, the setup program may be launched manually by double clicking on <CD>:\setup.exe. It is recommended that all defaults be selected during the setup process.

> *NOTE: SubSkillsNet 3.5 contains an interface to the Common Basic Operator Trainer (CBOT 9.0), SBOT and EWPro. Refer to section 13 for instructions on how to launch the three interfaces after they are installed.*

The SubSkillsNet applications run on WinXP and Win2000. The typical install includes the most often used SubSkillsNet capabilities and requires roughly 600 MB of free disk space.

Adobe Acrobat Reader is required to read the online SubSkillsNet documentation.

2.1 Modifying the Instructor Console

If you would like to reconfigure your Instructor Console by adding or removing a program, or adding an interface after a typical install: go to **Control Panel | Add/Remove Programs | *SubSkillsNet 3.5*** and click the **Change/Remove** button. Choose **Modify, Next** to enable the "Selected Features" checklist . From here you can modify the set of applications on your Instructor Console. (**Modify** only allows you to add interfaces to the IC, you not remove them through this function)

2.2 Setting up the Computers for Networking

Networking must be set up on each computer that runs SubSkillsNet, regardless of whether one computer will be running alone or multiple computers will be running together. This includes the station that is running the Instructor Console. The Instructor Console is used to launch any of the SubSkillsNet products, and each computer to be networked must have a TCP/IP protocol set up. If TCP/IP is not set up, see your network administrator.

3. A NOTE ON GRAPHICS CARDS

Hardware graphics acceleration is required for SurfCAT & SPOT legacy versions, BottomGun, CATHead, SurfCAT DX and SPOT DX. Visual effects such as dynamic ocean surface, textured landmass, detailed contact models and reduced visibility will not display correctly unless graphics acceleration is available. Most new computers, including laptops, support graphics acceleration. However, not all graphics acceleration hardware has drivers to support the SubSkillsNet requirements. In particular, the hardware must provide support for OpenGL or DirectX9 depending on the 3D applications chosen during the SubSkillsNet install. SurfCAT, SPOT, BottomGun and CATHead run with OpenGL. SurfCAT DX and SPOT DX run with DirectX9.

Note: The appropriate video driver must also be installed; the hardware alone is not sufficient. The following video cards or chipsets have been found to be acceptable:

for OpenGL-TNT or TNT2, GeForce 2 and above Trident CyberBlade i7 AGP (8420-64), ATI RAGE M7.

for DirectX9 - GeForce 4, ATI Rage M7

****The ATI Radeon All in Wonder 8500 does not support DX9 features, such as cloud cover. This card is not recommended for SPOTDX or SurfCATDX!***

4. VIEWING DATABASE OF VISUAL MODELS

The Contact Database Viewer (DB Viewer) is a browsing utility that allows a user to view each of the available visual models and access information associated with them (Figure 1).

This information includes TypeID and SMMTT ID numbers as well as physical characteristics, such as dimensions, masthead height (for mastheads above 2 feet) and speed and acceleration capabilities. To open, go to **Start | Programs | SubSkillsNet | *DBViewer***. The wheel control in the lower right corner controls the zoom; dragging the mouse within the view window controls the viewing angle. The text box on the right displays the contact's characteristics. The box on the left contains a list of all contacts in the database, although at present, not all contacts have 3D or acoustic models. For a list of available visual and acoustic models, please consult the SubSkillsNet Contact List (**Program Files | SubSkillsNet | Docs**).

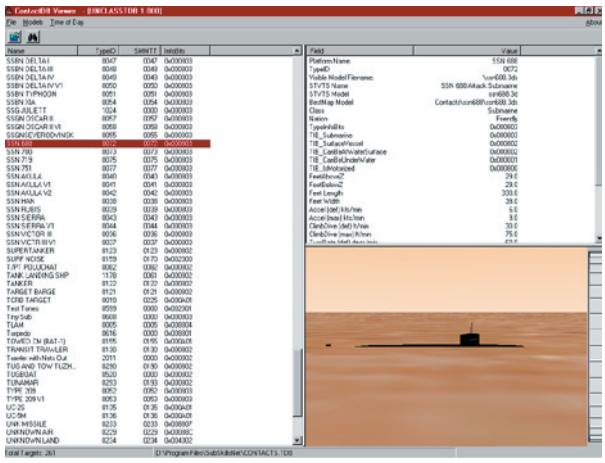

Figure 1. DB Viewer

5. SUBSCRIPT

SubScript is the scenario authoring and editing tool for use with SubSkillsNet products. With SubScript, platforms can be quickly added or deleted to a scenario and orders can be graphically scripted. It also enables the user to add a gaming area and change the environmental variables. By allowing users to control a variety of parameters of the scenarios—such as contacts, orders, time, and environment—SubScript gives the user a clear understanding of how a scenario will unfold.
A limited set of visual models for navaids may be accessed in SubScript for inclusion in scenarios. These models include red, green, and black ocean buoys; several lighthouses; front and rear range markers; and a generic factory and radio tower. The height of these navaids may be altered by providing a depth value for them in SubScript. These models should be used only in scenarios that do not access a gaming area. (Gaming areas are built in a separate application from a digital nautical chart CD.) Additionally, more than one hundred navaid models are gaming area specific, and are not available to SubScript.

For a complete product description, including step by step instructions, please refer to the SubScript User Guide located in the SubSkillsNet directory, in the Docs folder..

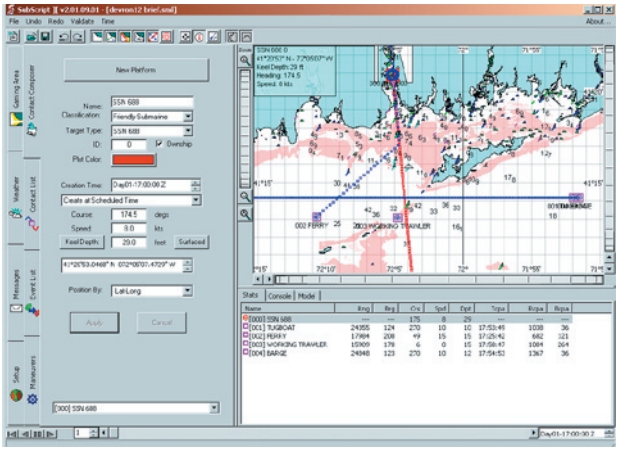

Figure 2. SubScript

6. INSTRUCTOR CONSOLE

The Instructor Console (or IC; see Figure 3) is the primary interface of the SubSkillsNet training suite. It is the control panel that allows an instructor to set up and monitor dynamic exercises. Although the IC offers some run-time control, Run-Time SubScript (RTS) is designed strictly for on-the- y platform control and situational updating. (For further details, please refer to Section 7: Run Time SubScript.)

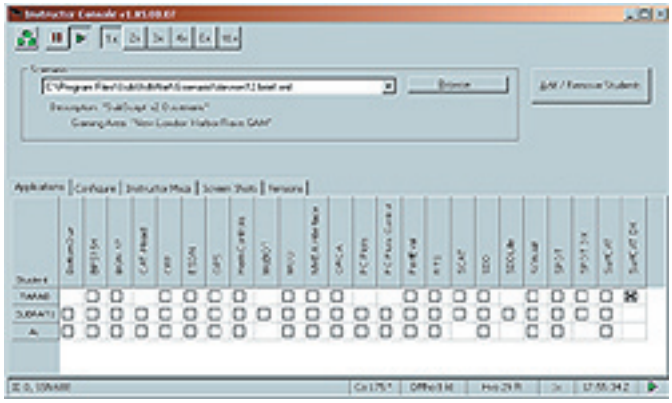

Figure 3. Instructor Console

Each of the SubSkillsNet training products operates on a PC (nominally a SOBT laptop) or on two or more networked PCs. A simulation server application plays a scenario, and it provides contact position and status to any number of client applications. Using the Instructor Console, training applications may be included in the network to provide, for example, periscope, radar, or bridge views of the scenario contacts. The Instructor Console computer controls target and ownship motion, as defined by scripted scenarios, or as directed in real time, for all of the applications.

6.1 Specifying Computers for each IC

A new version of the Instructor Console (v.1.05) is being distributed that enables an administrator to specify a list of computers on the network that can be students of their Instructor Console. (The CD is shipped with the default configuration which looks for all available computers on the network: <ComputerList broadcast=”true”>).

To use the new feature, find SSNComputerList.xml in: **drive:\... Program Files\SubSkillsNet\Data**. Open the file with a text editor (e.g Word Pad, Note Pad). The following is a sample of the file:

<ICAddStudentConfig>
<ComputerList broadcast=”true”>
<Computer name=”computer1” />
<Computer name=”computer2” />
<Computer name=”computer3” />
<Computer name=”computer4” />
<Computer name=”computer5” />
</ComputerList>

• To look only for individual computers, make sure <ComputerList broadcast="false”>.
This configuration only looks for students on computers listed between <ComputerList broadcast=”false”> and </ComputerList>. Replace “computer1”, “computer2” and so forth with the name of the individual computers to look for.

Note: If there are more than 5 computers, copy the <Computer name= “computer5” /> line and paste it above </ComputerList> as many times as you need.

'Save' your changes. If you get a warning message, Click ***Yes*** or ***OK***. Then, ***'Close'*** the file. This only needs to be done once per Instructor Station if the configuration will remain the same.

6.2 Conducting an Exercise

After the physical connections have been made and the network of computers have been set up, start the Instructor Console and select the computers to be included in the training. Select a scenario to be played, launch the desired training application(s), and start the scenario playing. The following sections provide procedures for these steps.

6.2.1 Starting the Instructor Console

To open the Instructor Console, left click on the mortarboard icon ( ) found in the Windows task bar tray typically at the lower right corner of the screen. If no icon is present, go to **Start | Programs | SubSkillsNet | *Instructor Console***. This will launch the Instructor Console application and place the icon in the tray where it can be conveniently accessed.

6.2.2 Adding Students/Stations

The next step is to add student stations to the training session, if they have not yet been included.
At the Instructor Console, press the "Add/Remove Students" button to display the list of available stations. You'll now be able to select the stations on the network that will participate in the training session (see Figure 4).

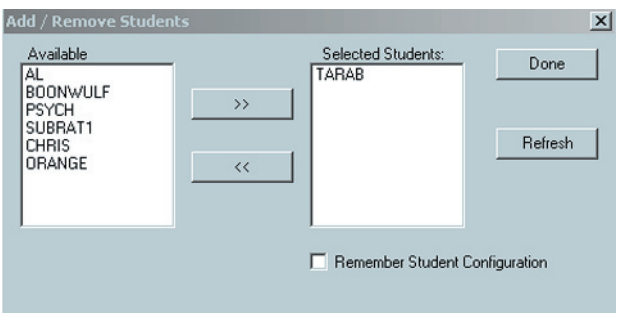

Figure 4. Add/Remove Students

Highlight the desired stations under the "Available" column on the left, and then click on the right arrow button. As you select student stations, their names will appear in the right column.

Once you have selected your group of student stations for your training, put a check mark in the "Remember Student Configuration" check box for the IC to save the list for future training exercises. As a result, the next time you start the IC and click the "Add/Remove Students" button, the selected student list will populate with the saved list as long as these students are available.

To confirm your choices and return to the Instructor Console, click the "Done" button. The station running the Instructor Console will appear at the top of the list. After the desired stations have been selected, a matrix under the Instructor Console's Applications Tab will list networked stations (vertical column on the left) and all available applications (horizontal row) represented by check boxes.

Notice that all applications may not be available on every workstation (this is the result of not installing all applications on every student's station). The availability of a particular application is indicated by the presence of a check box corresponding to the workstation in question. If a check box for an application exists next to a particular workstation, then it can be run at that workstation.

6.2.3 Troubleshooting

If a desired station does not appear on the "Available" list, it may be because of the following:

a) The Instructor Console may not be running on it. Have the operator go to the station and check the task bar for the icon and, if missing, select it from the Start menu.

b) The Instructor Console is running, but the station has already been selected. It may have been selected by its own Instructor Console or another IC on the network. Have the operator deselect it.

c) That station may not be on the 'ComputerList' configured in the SSNComputerList.xml (refer to section 6.1.1)

Note: If a station still does not appear on the "Available" list, exit the Instructor Console on that station by right clicking on the tray icon and selecting Exit. Then, restart the Instructor Console from the Start menu. Then, on the Instructor Console, click the refresh button on the "Add/Remove Students" dialog box to get a refreshed list of available workstations.

6.2.4 Launching Training Applications

Under the name of the training product you wish to launch, left click in the box in the row of the desired station. This will launch the training product on the selected station.

Multiple applications can be run on the same computer, limited only by its processing speed. Different applications can be run on each of the computers, or all of the computers can run the same application.
The following are the SubSkillsNet products available for training:

- Bottom Gun (game-based trainer for periscope operator skills)
- BPS-15H (radar)
- BQN-17 (fathometer)
- CAT-Head (surfaced bridge view using a head mounted display)
- CEP (Contact Evaluation Plot)
- DREP (Data REPeater)
- ESGN (Navigation Data)
- GPS (Global Positioning System)
- Helm Controls (controls speed, course, and depth of ownship)
- MOO (Manual Operator Override)
- MoBOT (Maneuvering Board)
- NMEA Interface (National Marine Electronics Association) Interface to VMS
- ORCA (Onboard Radar Collision Avoidance) trainer
- PC Plots (auditory reporting of contact bearing & frequency)
- PerfEval (scenario recording and playback utility)
- RLGN (Navigation Data)
- RTS (Run-Time SubScript, control of exercise as it plays)
- SCAT (Sonar Collision Avoidance Trainer)
- SDD (Ship's Data Display)
- SDD Lite (variation of SDD)
- SONAR (selected sonar displays)
- SPOTDX & SPOT (Submarine Periscope Observation and Tracking) trainer
- SurfCATDX & SurfCAT (surfaced bridge view)

6.2.5 Selecting the Scenario to be Played

Scenario files are the situational scripts the simulator uses to govern the events, platforms and environment in a training session. Typically, each scenario contains a set of platforms along with a script that defines maneuvers/orders for each platform. These platforms may interact in gaming areas—graphical environments with visual and physical features defined by geographical data (i.e. NIMA's DNC and DTED databases).

To search for scenarios, press the "Browse" button to bring up a standard Windows File Open dialog. (The path defaults to the directory containing the originally distributed scenarios. This is also the default path SubScript uses to save Scenarios.) Once a scenario is selected, its file name will be displayed in the scenario window and directly below, a brief description of the scenario and the corresponding gaming area will appear (if any). A scenario may also be selected from the Scenario drop down list box in the Instructor Console. This list box contains the filenames of the most recent scenarios used. Please note that a scenario may take several seconds to load if it has a gaming area associated with it.

6.2.6 Playing the Scenario

Selecting a scenario does not automatically start playing it. The Scenario can be run at any time by clicking on the play button in the Instructor Console, but it may be advisable to wait until all desired training applications have been launched. The scenario may also be stopped, reset, or set to run faster than real time by using the appropriate buttons on either side of the play button.

6.2.7 Ownship in Scenarios

Any contact in a scenario may be designated as ownship through the Configure tab on the Instructor Console. However, only the 688I, 726, 774, CG 47 (Ticonderoga), T-AH 19 (Hospital Ship), FFG 7 (Perry), Supertanker, P3 Orion, Cigarette Boat, Sjoormen and Fearless have bridge models. When other platforms are assigned as ownship, there is no bow or surrounding superstructure in the view.

7. RUN TIME SUBSCRIPT

Run Time SubScript (RTS) is the exercise control application that monitors target and ownship motion and environmental variables. With RTS you can control the events in the scenario as it is running. To use this tool, play a scenario, then choose RTS from the Instructor Console matrix.

7.1 Interface Overview

Upon startup, you may notice that the application layout is very similar to the old GeoSit capability (the original geographical display used for monitoring an exercise). However, RTS enables significantly greater user control over the scenario. These controls can be made visible by pressing the 'Left-Side Tab' and 'Bottom Tab' toggle buttons (Figure 5). The Helm Wheel icon -'Ownship' button (Figure 5) is used for direct access to the Ownship control tab (Section 7.1.1). Select both tabs by clicking on them.

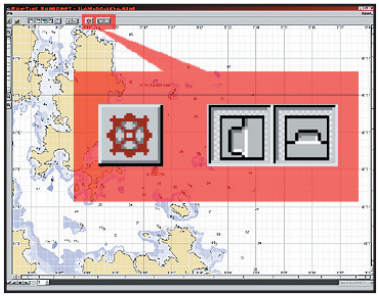

Figure 5. Ownship, Left-Side and Bottom Tab toggle buttons.

The main screen consists of display areas and user controls (Figure 6). Positioned on the right side of the screen is a geo-situational display (GeoSit) of a scenario. The vertical tabs on the left panel enable the user to control a scenario as it is playing (e.g., contacts, maneuvers, environment).

Additionally, the GeoSit tool box (located on the tool bar) allows an author to manipulate scenario characteristics, such as adding or removing navaids, editing water depth, and adding display environments, such as range rings.

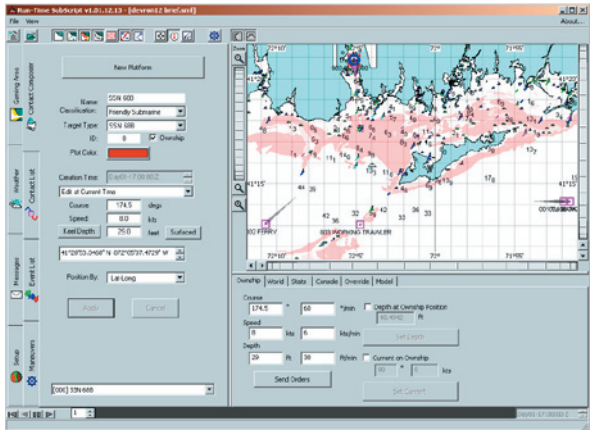

Figure 6. RTS with tabs enabled.

For example, to toggle the Track History and the Speed Vector display for the contact icons in the GeoSit, click on the corresponding buttons to the left of the Helm Wheel icon (Figure 7).

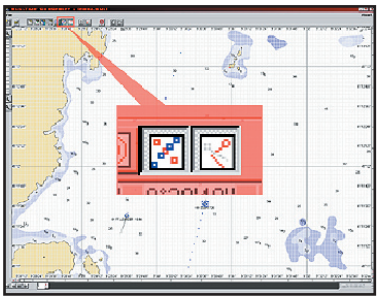

Figure 7. Track History and Speed Vector toggle buttons.

When enabled, track history will draw a dot along the path of the contact in the GeoSit at a rate of once per minute. The greater the speed, the wider the plotted intervals will appear along the contact's track.

> *Note: For legacy Attack Center builds ONLY, Periscope Up & Periscope down buttons are added to toolbar. These buttons will be used to re ect the up/down movements of the STVTS periscope.*

It is important to note that RTS is not an authoring tool--you cannot save any changes that you make. To author scenarios, use SubScript (included in this software release. Refer to Section 5 of this User Guide for further detail).

7.1.1 Bottom Tabs (refer to figure 5)

These tabs are located directly below the GeoSit view. Click on the tabs to access their respective features.

Ownship. Allows direct access to immediately affect course, speed and depth as well as depth under keel & current.

World. Here you can change apparent time of day and default ocean depth during an exercise. Additionally, you may set environmental phenomena including sea state, visibility, turbidity, cloud cover and wind direction. The rate of change for visibility can be set to take effect over time, simulating a 'rolling fog' effect.

Stats. Provides real time navigation data for the platforms in the scenario including values for range, bearing, course, speed, depth, Tcpa, Rcpa and Bcpa.

Console. Lists gaming area and scenario file status.

Override. Enables user to override individual platform characteristics. This permits the Instructor/Operator to add unplanned events. Click on the plus ("+") box next to a platform to expand the subcategories.

- Casualties. Simulate an impaired rudder, add GPS FOM, choose between Gyro 1 and Gyro 2, apply gyro failure and/or error, and simulate a man overboard situation with a human 3D model.

- Overrides. Use these features to simulate localized nautical anomalies, such as a change in ocean bottom depth (to provide "red" and "yellow" soundings) or an unexpected current shift.

- Emitters. When interfaced to EWPro, the Emitters' window enables users to turn emitters off/on. (some platforms do not have emitters, refer to the SubSkillsNet Contact List)

- Lights. Toggles running & auxiliary lights on/off.

Model. Displays a 3D thumbnail of the selected platform in the scenario. Click and drag within the window to rotate the model and view it from different angles.

7.1.2 Left Side Tabs (refer to figure 5.)

Contact Composer. This feature allows you to modify and add platforms. Modifications to pre-existing platforms can only be made at the current time in the scenario. New platforms can either be made to appear at the current time or in the future. Changes made in 'Contact Composer' take effect immediately (e.g., a depth change is instantaneous; a selected platform can be dragged to a new location). To issue orders or set waypoints, use the 'Maneuvers' tab described below.

To add a platform, click the 'New Platform' button. The active platform that is being defined will be indicated by a red bull's-eye with an attached heading pointer (Figure 8). Next, you can determine classification, target type, ID number, course, speed, depth/altitude and location. When setting the platform's "Classification," the "Target Type" drop down menu adjusts for each class. Once a target type is chosen from the drop down menu the "Name" box re ects that choice and an ID number is chosen automatically. "Name" and "ID" can be manually adjusted if desired. To specify a time when the platform will enter the scenario, select Create at Scheduled Time from the drop down menu. Then, key in the desired time. You have the option to position the platform by LAT LONG, range and bearing from ownship or course-relative range and bearing. Use the ***Apply*** button to implement the changes.

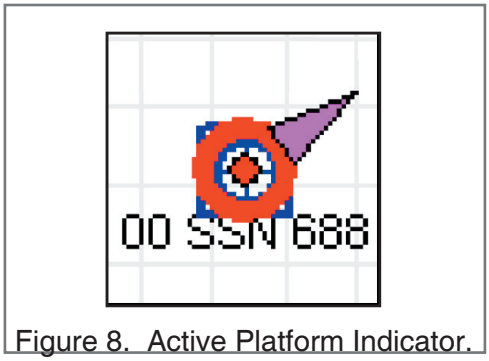

Figure 8. Active Platform Indicator.

To modify a platform, select the platform from the stats tab, the GeoSit or the drop down menu at the bottom of 'Contact Composer' tab. Now you can change classification, target type, ID number, course, speed and keel depth/altitude. To have SubSkillsNet automatically bring the platform to proper simulation keel depth, click on the ***"Surfaced"*** button to the right of the depth/

altitude field. For the platform's location, you can position by LAT LONG, range and bearing from ownship or course-relative range and bearing. Use the ***Apply*** button to implement the changes.

Gaming Area. Lists gaming area stats. Click and drag the green box to change your overhead view of the scenario.

Contact List. Lists the active platforms in the scenario. To delete a platform, left-click to highlight then click the delete button.

Weather. This tab allows you to define environmental conditions. At present, visibility, sea state, turbidity, cloud cover and wind direction have been implemented. (Future versions are slated to include wind speed, temperature of air and sea, and humidity.)

An example of how to use this feature:

To change the simulated visibility in a gaming environment, first click the "New Values" button. Then click on "Visibility" in the Environment State window. Next, set desired visibility distance in yards (you may also select a time at which the defined visibility conditions will occur- the default time of implementation is the current time). Press the visibility button to update to the new visibility condition. Click ***OK*** to save this change.

Event List. Displays a list of scripted events in chronological order. It is not possible to modify existing orders; however, you can delete those that are undesired and re-issue the replacement orders. As with the contact list, events may be deleted by left-clicking to highlight then clicking the 'Delete Selected Events' button.

Messages. Utilized to script reminder messages.

Maneuvers. Use this tab to add and modify waypoints and orders. Left click on a platform in the GeoSit or select it from the stats panel below the GeoSit for orders or waypoints. Once a platform has been selected, a dashed square box will appear around that platform.

■ Waypoints. Click the ***"Waypoints"*** button at the top of the 'Maneuvers' tab (Figure 9). There are two methods to add a waypoint. Either click on the ***"New Waypoint"*** button and manually enter the information into the necessary fields, or right click in the GeoSit where a waypoint should be located. To move/modify a waypoint, left click on it and drag it around in the GeoSit or manually alter the LAT LON values in the data field. Click ***Apply*** once the waypoint is positioned correctly.

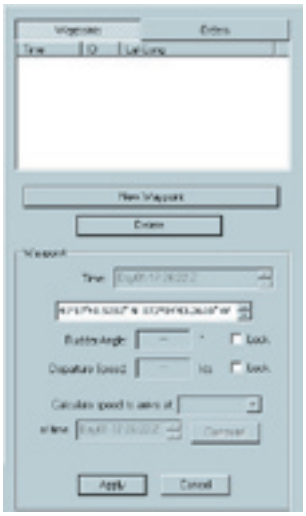

Figure 9. Setting Waypoints.

To delete a waypoint, highlight the waypoint in the display window and click the ***"Delete"*** button.

■ Orders. Click the ***"Orders"*** button at the top of the 'Maneuvers' tab. To script a course change, click on the ***"New Course"*** button and enter the desired course and direction of turn of the platform. To script a speed change, click on the ***"New Speed"*** button and enter the desired speed and/or the acceleration rate of the platform. By clicking the ***"New Depth"*** button, depth and dive rate can be entered. After each new order, click on the ***Apply*** button, for it to be added to the list of orders in the task window (refer to Figure 10).

You can schedule the order to execute in the present or in the future. If you want an order to take effect immediately, then click the "Use current time" box.

Figure 10. Scripting Orders.

Setup. The initial time of day selected affects ambient light level (e.g. morning, mid-day, night) and sun, moon and star positions. Time of day may be selected in several ways. Local standard (Std) time, Local Daylight Savings (DST) time or GMT may be entered manually. For local time, use the drop down menu to select time zone and set desired initial time of day. (Local time of day is specific to the real world location that the gaming area corresponds to.)

8. HELM CONTROLS

Helm Controls allows the student to adjust the course, speed, and depth of ownship. To adjust any of these orders, click on the corresponding button and enter a value in the pop-up calculator, via mouse or key entry. The user can also manually change engine order, rudder control, and repeater compass by moving the dial found on the display.

For a less graphically realistic, more straightforward interface, click on the **SIMPLE VIEW** button, located in the upper right hand corner of the helm unit (see Figure 11).

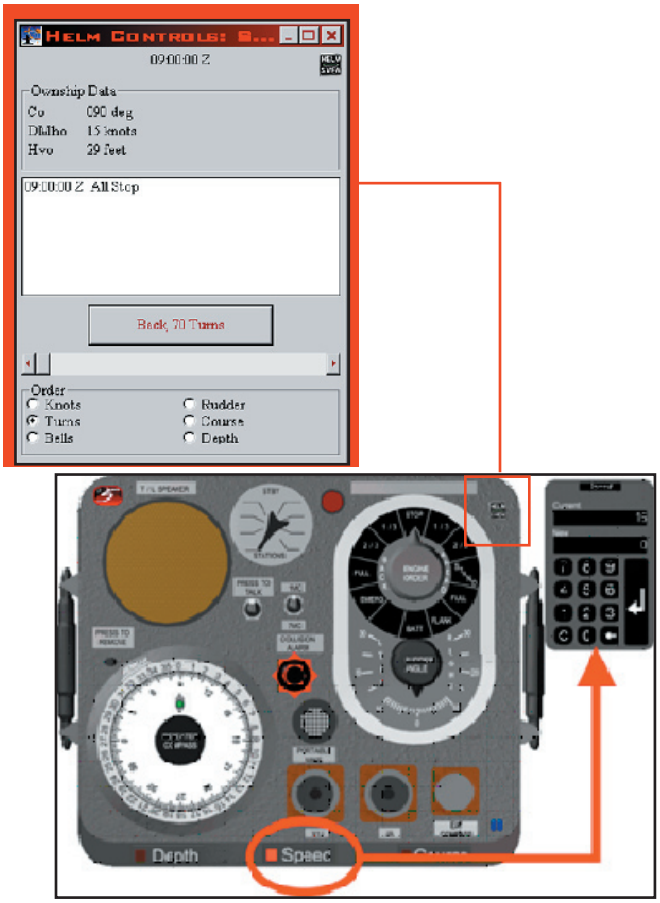

Figure 11. Helm Controls (with Speed Pop-Up Calculator and Simple View Enabled)

9. MOO

The Manual Operator Override (MOO, Figure 12) application can be used to synchronize one or more SubSkillsNet training products with an external simulation running in a team trainer (in the absence of a software interface between the two simulations). MOO can also allow a user to position or reposition any platform in a SubSkillsNet scenario while that scenario is loaded. The position of each platform relative to a position reference (which must be another platform) is continuously displayed as range and true bearing, along with its course, speed, and depth.

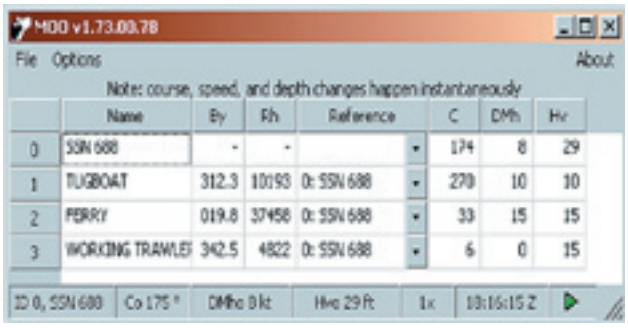

Figure 12. MOO Interface.

A list of all platforms available in the scenario can be found under **File|Select Platforms**. Highlight the ones that are to be controlled and click OK. (If ownship is to be positioned relative to a platform, do not select that platform.) By default, all selected platforms are referenced to ownship. This reference to ownship may be changed by clicking on the arrow button on the right side of a Reference field and selecting the platform that will be the new reference. To change a bearing, range, course, speed, or depth value, click on it and type in a new value. The change will be made effective when the cursor is clicked outside of the current cell or if the Enter key is pressed. A change to bearing or range will be effective immediately. A change to course, speed, or depth may be either immediate or acted upon as an order, depending on the state of the **Options|Course, Speed, Depth Changes are Ordered, not Instantaneous** menu item.

Note: The order of the platform list may be changed, and platforms deleted, by right clicking on a platform's name and selecting an option from the popup menu.

10. SURFCAT & SURFCAT DX

Surfaced Collision Avoidance Trainer (SurfCAT) allows novice OODs and Contact Coordinators to practice making maneuvering decisions in open ocean situations. It is a simulation of a surfaced bridge view in which users may visually track moving contacts by scanning the area around ownship. The system may be used to provide training in the identification of contact type, as well as estimation of contact range, true and relative bearing, course, speed, and angle on the bow. In addition, it can be used in conjunction with the Attack Centers and the SPAN trainers at submarine training facilities to incorporate crew members who might otherwise not be able to practice with their team.

10.1 Two versions of SurfCAT

We now offer SurfCAT (legacy version) and SurfCAT DX (see Figure 13) during the SubSkillsNet install. They differ by the graphics libraries used to develop the applications. The new application, SurfCAT DX, was developed using DirectX9 which offers significantly enhanced features. SurfCAT DX has joystick capability for elevation and azimuth control, a wind-driven wave model, a dynamic ocean, multiple sea states, cloud cover, moon & sun glare.

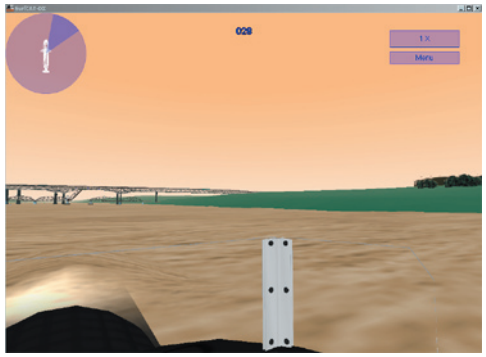

Figure 13. SurfCATDX

SurfCAT (legacy version) was developed with OpenGL and must be chosen if running on an Microsoft NT box. This version does not have joystick capabilities.

Refer to section 7, RTS for instructions on how to change environmental features visible in SurfCAT & SurfCAT DX.

11. SPOT & SPOT DX

The Submarine Periscope Observation and Tracking (SPOT) trainer is a periscope observation skills trainer. Scripted scenarios allow users to visually track contacts through a simulated Type18 periscope view. The system may be used to provide training in the identification of contact type, as well as in estimation of contact range, true and relative bearing, course, speed, and angle on the bow.

11.1 Two versions of SPOT

There are now two versions of SPOT to choose from during a SubSkillsNet installation: legacy SPOT and SPOT DX (Figure 14). The new SPOT DX has a wind-driven wave model, a dynamic ocean, multiple sea states, variable underwater visibility (turbidity), cloud cover, moon, sun glare, and head window washover. SPOT DX also supports use of a joystick.

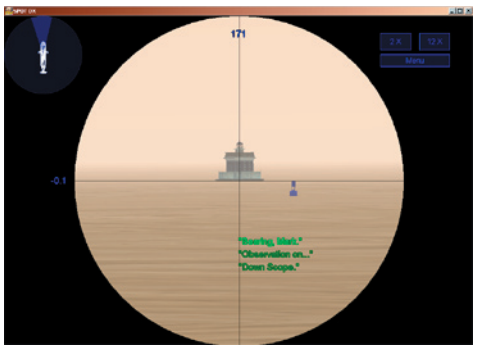

Figure 14. SPOTDX

There are three ways to change the direction of view in both versions of SPOT. One is to move the field of view (FOV) triangle in the upper left corner towards the desired direction of view. The second way is to press the left mouse button and drag the mouse in the periscope view in the appropriate direction. Finally, in the periscope view, the azimuth can be changed by using a mouse wheel. To change the field of view (and the magnification), use the magnification buttons on the toolbar. SPOT's magnification factor can be set for 1.5X, 3X, 6X, 12X and 24X. For comprehensive guidance on setting the parameters found in the ***View*** menu of legacy SPOT, please refer to Section 12.

In legacy SPOT, users select contacts by right-clicking which enables the ***Pickle Bearing*** button. Once pressed you will be queried to enter a victor number into a dialog box. In SPOT DX, right clicking on an object enables three options - ***Bearing Mark, Observation On, and Down Scope***. Depending on choice, you will be prompted through the steps to complete the function. PerfEval (section 21) receives the information sent from either version of SPOT, and displays it on the Geosit. For detailed information consult the PerfEval User Guide located in the SubSkillsNet directory, in the Docs folder.

Refer to section 7, RTS for instructions on how to change environmental features visible in SPOT & SPOT DX.

12. OPTIMIZING GRAPHICS FOR LEGACY 3D APPLICATIONS

SurfCAT and SPOT (legacy versions) can display 3D terrain and scenarios with fog if the required hardware and drivers are resident on the computers on which they are installed (refer to Section 3). On slower, less capable computers, a performance decrement is noticeable when these applications are run. For this reason, SurfCAT and SPOT have menu items that allow certain graphics features to be turned on or off.

To configure 3D settings in SurfCAT or SPOT (legacy versions):

1. Open the Instructor Console (IC) by left clicking on the mortarboard icon ( ) found in the Windows task bar tray typically at the (right side) bottom of the screen. If no icon is present, go to **Start | Programs | SubSkillsNet | Instructor Console**.

2. Next, launch either SPOT or SurfCAT by clicking on the appropriate box under the Applications Tab. (For more detailed instructions on how to use the IC, please see Section 6: Instructor Console).

3. Select **View | Configure 3D Settings** from the menu bar. Figure 15 illustrates the options that may be selected to optimize system performance of the

graphically intensive applications (SPOT, SurfCAT, and CAThead).

The following settings can now be adjusted. *(You may have to proceed on a trial and error basis to find the proper mix of variables that work best, given your machine's capabilities).*

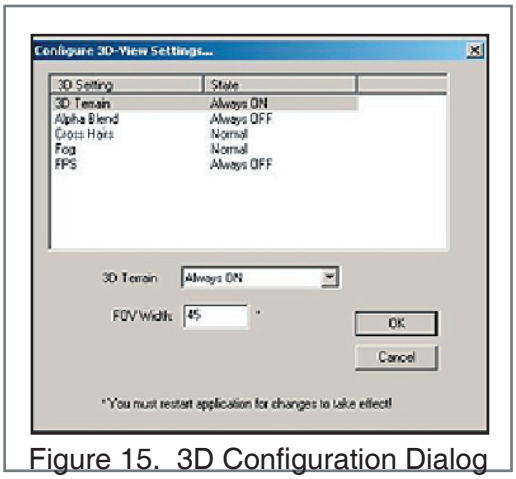

Figure 15. 3D Configuration Dialog

Start by enabling FPS (Frames Per Second). The FPS display relays the update rate of the visual scene. This should be enabled initially so that you can see the effects of changing the other characteristics. The objective here is to maximize FPS; the higher the FPS rate, the smoother the scene will render in real time. Each of the five options has three states; but when configuring graphical optimization, use only always on or always off.

> *Note: Once the adjustment is made, it is necessary to exit the application. When you restart the application, the new settings will be in effect for both SPOT and SurfCAT on ONLY that computer.*

3D Terrain: This option determines whether or not landmasses are rendered. In extreme cases, disabling this feature may alleviate performance issues such as a lagging display and jerky motion, but bear in mind that only open ocean will be displayed.

Alpha Blend enables control over color transparency, such as those used in the bow wave. There is a performance decrement when this is enabled on some computers.

Cross Hairs enables the display of the cross hair in SurfCAT, which indicates the bearing being sighted.

Fog: Some video drivers incorrectly report their level of OpenGL support. This results in problems with displaying some of the advanced visual effects, such as simulated fog. The best solution is to obtain a new set of video drivers from the manufacturer when they are available. If new drivers are not available or do not fix the problem, fog should be disabled. (This problem is common on the earlier model Panasonic CF48.)

FPS (Frames Per Second): When FPS is enabled, a display will be visible in the upper right hand corner of the window. This displays the number of polygons being drawn in each frame and the update rate in frames/second. The update rate is affected by the other parameters; try to maximize it.

> *Note: Enable this option only when setting the other parameters. It should be off during training.*

Field of View: The FOV parameter is the horizontal viewing angle subtended by SurfCAT. Reducing the FOV will increase the update rate. The default FOV for SurfCAT is 45 degrees.

13. INTERFACES TO: CBOT, SBOT & EWPRO

SubSkillsNet has the ability to transmit and receive data from CBOT (Common Basic Operator Trainer), SBOT (Sonar Basic Operator Trainer) & EWPro. They are separate products, and are not included with the SubSkillsNet distribution. CBOT & SBOT are available from NUWC NPT. EWPro is an RDSI product. For installation procedures and user guides, contact those organizations.

After CBOT, SBOT and/or EWPro are installed on their respective computers, they must be enabled through SubSkillsNet to be available to run with SubSkillsNet. To ***Enable***, run ***CHEAP Config*** from the **Start | Programs | SubSkillsNet** menu. This will put the enabled program in the applications matrix on the IC. From the IC, click the box below the program name that corresponds to the computer you wish to launch the application on.

13.1 Instructor Console Contacts Tab

The ***"Contacts" tab*** displays tracker data from SONAR and SBOT, and it is also used to assign/remove contacts to track. The contact information is automatically sent to CBOT as they are added, updated, or removed.

Contacts may be added, updated, or removed by pressing the appropriate button. When adding a contact to track, the following information must be specified: sonar system, tracker ID, array type, propagation path, manual or ATF, and if applicable, frequency. This information will then be displayed at the bottom of the ***"Contacts" tab***. Another way to add a contact is to pickle a bearing on a contact in the SubSkillsNet periscope simulator. To remove a contact, first select it in this lower window and then click on ***"Remove Contact".***

13.2 Emitters

EWPro provides SubSkillsNet with emitter data for contacts within a scenario. From the RTS Override tab, the instructor can turn individual emitters on or off. (refer to section 7.1.1)

Refer to section 2.1 for interface installation procedures.

14. SONAR

The SONAR application simulates a generic Spherical Passive Broadband Array SONAR display. SubSkillsNet's SONAR emulation enables a sonar user to direct target information to Fire Control during a training exercise.

14.1 The Sonar Display Window

The primary components of the SONAR display are the waterfall and a column of tracker cells. Above the waterfall display are tick marks bearing the cardinal directions. Also present is the bow marker, represented by a "V." A faint line 180º relative to the bow marker serves as a stern marker (Figure 16).

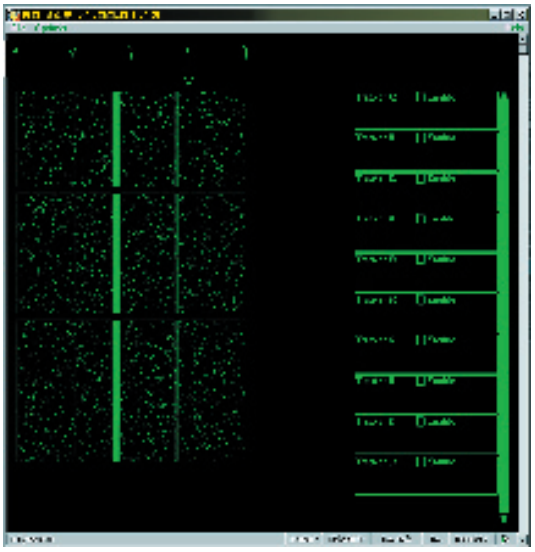

Figure 16. Sonar Application Window

The sonar trackers may be enabled or non-enabled. Both states are represented in Figure 17. When enabled by a check box, each tracker cell displays information and options such as designation, bearing, return strength, automatic target follow (ATF) on or off, and buzz bearing.

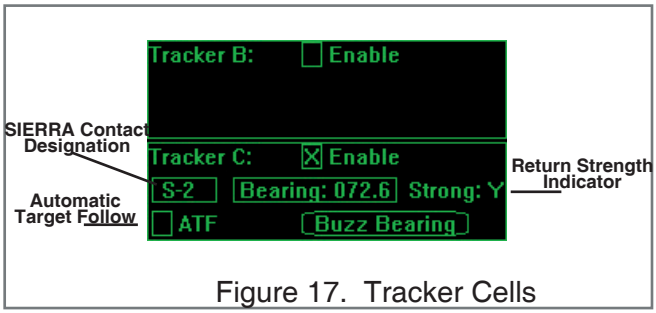

Figure 17. Tracker Cells

To begin tracking, first enable a tracker. A designator icon corresponding to the tracker ID ("D," for example) will then appear on top of the waterfall display, below the directional ticks. Drag the icon over the DIMUS trace you wish to track and click Buzz Bearing to send a bearing data point to the fire control system. Alternately, click ATF to automatically track the contact and send data to fire control continuously.

14.2 Monitoring and Tuning Contact Data

To access the control variables and a contact list for tracked platforms in the scenario, click on the ***Contacts*** tab in the IC.

This tab displays a breakdown of the contacts tracked, the time elapsed since initial contact (Age), the sensor array type, the propagation path and so on. Notice that if ATF was enabled when tracking a contact, information is constantly being transmitted and updated.

To alter the range of a contact, open the Contact Range dialog panel by clicking on ***Options*** | ***Tune Contacts*** Figure 18)**.** Select the desired contact by clicking on it in the displayed list. Enter a new value in the **Change Max Detection Range to** field and click ***Apply*** to update the range. Click **OK** to exit.

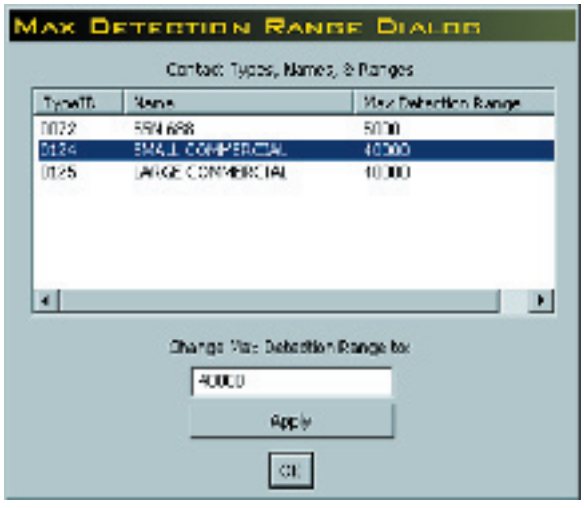

Figure 18. Max Detection Range Dialog

15. CEP: CONTACT EVALUATION PLOT

The CEP (see Figure 19) represents the bearing data the contact evaluation plotter would annotate on the plot. Tracked contacts from SONAR or SPOT form a plot on a grid consisting of bearing versus time (x vs. y). To change the time interval represented in the CEP, click on the desired button in the upper left-hand corner: 02, 05 or 10 minutes. To display 2˚ grid lines, click on the green and yellow grid button to the left of the time controls. Also, to view the older plotted data in the CEP, move the slider bar. The slider bar does not activate until the window fills up with potted data.

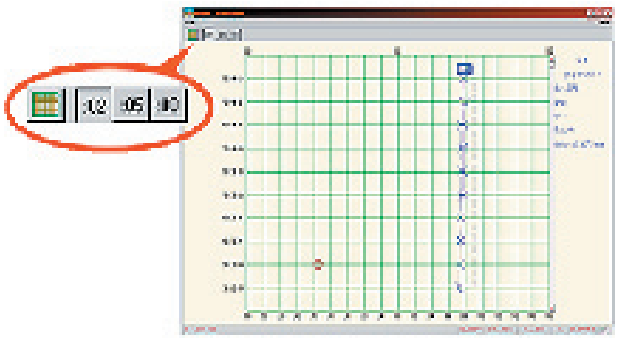

Figure 19. CEP Controls

In addition to being color coded, each plot is headed by the contact designation type code in a box, e.g. S-4 or V-7. Ownship is represented by a black line; solid for submerged and dashed for surfaced. To view the bearing rate of a leg, make sure the plot is at its most recent (or uppermost) time mark, using the slider bar if necessary. Click your mouse on the head of the plotted contact, in the boxed area containing the contact name (S-4, for example). The bearing rate for that leg will display on the right hand side. The number will appear under the CEP and be color-coded to correspond to the line to which it refers.

Note: If multiple plots share the same bearing, CEP will stack them one on top of the other.

16. SCAT

Sonar Collision Avoidance Trainer (SCAT) provides practice in safely coming to periscope depth. It includes Towed Array Passive Broad Band with direct path and bottom bounce choices, Spherical Array Passive Broad Band and it displays the Contact Evaluation Plot.
For Towed Array, the waterfall display will show bottom bounce traces (if chosen by the instructor) and assign sierra numbers to those traces.

17. BPS-15H

The latest BPS-15H simulation (Figure 20) incorporates new features such as: Data Logging, PAD Vectors, Trial Maneuvers, Clutter, Improved Target Returns, Manual Plotting, Landmass and Navlines. Those functions that are implemented have white button labels; those not implemented have background color labels. Instructions on how to send target data to VMS from BPS is found in the NMEA Interface User Notes located in your SubSkillsNet directory in the docs folder (this document is available if NMEA interface is installed).

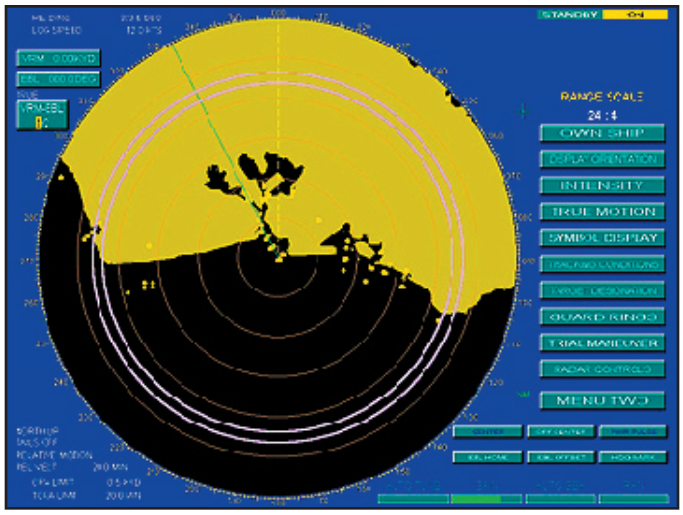

Figure 20. Display of BPS-15H

18. ORCA

On-board Radar Collision Avoidance (ORCA) trainer offers the user practice in contact management skills (e.g., determining CPA) on the SPA-25E (refer to Figure 21). It consists of a radar repeater simulation with a dynamic sweep and interactive controls. Controls include range and bearing cursors, range rings, range selector, and strobe cursor. In addition, a simulated grease pencil can be used to plot contact positions, project the track, and translate predicted positions down the track. The radar repeater functions can then be used to determine CPA parameters, which can be entered into the system to measure user performance. Fifteen dynamic contacts can be tracked concurrently.

Figure 21. ORCA

19. BQN-17

The BQN-17 fathometer trainer (Figure 22) enables a user to set up and use the BQN-17 fathometer in various modes. The objective of this product is to develop an operator's skill in reading ocean depths in several different modes. These modes are shallow, shallow expanded, deep, and contour. During the recording session, the history of the recorder window can be viewed at anytime. Also, histories can be saved and viewed at a later time.

Figure 22. BQN-17 Display

20. GPS

The Global Positioning System (GPS) Simulation provides practice in the Initialization and Navigation modes of AN/WRN-6(V) Shipboard Navigation Sets (see Figure 23). The system may be used to provide training in the monitoring and editing of destination and waypoint information. Refer to the GPS user manual for further assistance on how to use this trainer.

Figure 23. GPS Display

21. PERFEVAL

PerfEval is a part of the SubSkillsNet (SSN) family of applications. It allows recording and playback of SSN scenario data through the Instructor Console (IC) for viewing concurrently with the exercise or for later review. Using PerfEval, the instructor and/or student may view exactly what happened during a training scenario.

PerfEval operates in two modes: **Connected** (to the IC), and **Disconnected**. When PerfEval is **Connected**, it operates like any standard SubSkillsNet program, obeying the IC's commands to play, pause, change time running rate, etc. Therefore, when **Connected**, PerfEval displays what is currently transpiring in the scenario. When **Disconnected**, PerfEval displays dials at the bottom of the screen that allow the user to manipulate time, updating its displays to show data from a selected time in the exercise. PerfEval is organized into several sub-applications accessible as horizontal tabs which are lined up at the top of the main display window.

For a comprehensive look at PerfEval's capabilities, please refer to the PerfEval User Guide.

22. NMEA INTERFACE

The NMEA Interface application transmits National Marine Electronics Association (NMEA) formatted messages over a COM port. The messages are created from data generated by a SubScript scenario. This allows other applications that accept NMEA 0183 messages to receive real-time simulation updates for both ownship and contacts.
For more technical details on this product, please refer to NMEA Interface User Notes located in the SubSkillsNet directory, in the Docs folder.

23. ESGN

ESGN (Figure 22) now models the actual Inertial Navigation System, AN/WSN-3A(V)5,8 in graphical interface as well as functionality. Both ESGN units are contained in the ESGN program. From the 'Options' menu you can choose to display one at a time or both at once on the same screen. The ESGN application simulates the Schuler oscillation effect with gradual dampening on all acceleration-derived data (e.g. position velocity). The parameters for controlling the oscillations can be set in RTS (refer to section 7).

Figure 24. ESGN

24. DREP

DREP (Data REPeater) provides the following information on ownship: latitude, longitude, heading, speed, and velocities (both north and east). With the exception of error control, there is no direct manipulation or change of this display by the user; changes made using other trainers (e.g. MOO, RTS, Helm Controls) will be re ected in DREP.

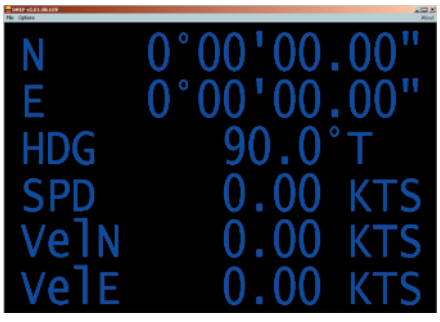

Figure 25. DREP

25. RLGN

RLGN, (AN/WSN-7A) has been added to SubSkillsNet (Figure 26). The RLGN also models the Schuler oscillation effect with gradual dampening which can be controlled in RTS (refer to section 7). The RLGN allows the user to access either gyro 1 or 2 within the same panel by simply turning the System Switch. Currently the RLGN is fixed in one mode and does not model user interaction beyond switching between the two systems.

Figure 26. RLGN

26. SDD

The Ship's Data Display (SDD) simulates ownship SDD by relaying information such as time (within the scenario), course, speed, and depth of ownship. It also displays the bearing output from both #1 and #2 scopes.

This display receives its data from the simulation and from periscope student station inputs.
SDD Lite is a variation of SDD with a customized display and the option to show SONAR frequency data. To show the frequency data for a contact select **Options| Select Sierra** from the menu bar. Choose the Sierra from the drop down box and click ***OK***.

To set frequency precision select **Options| Frequency Precision** from the menu bar. Choose the precision and click ***OK***. (For further information, please refer to Sub Section 14.2: Monitoring and Tuning Contact Data in the SONAR Section).

27. BOTTOM GUN

Bottom Gun is a training game designed as an enjoyable and educational way to practice calling periscope contacts' divisions and angle-on-the-bow (AOB). Bottom Gun simulates the view through a Type-18 periscope. Since Bottom Gun uses dynamic views, the player can scan and assess an evolving traffic (or tactical) situation in order to determine other ships' range and AOB. Using these estimates, the level of collision threat (i.e., coming too close to own ship) is ascertained. If a ship is determined to be a safety threat, the player can then choose to fire missiles and sink that ship.

For a complete overview of this game, refer to the Bottom Gun User Manual. (This product is currently undergoing significant upgrades in its capabilities and appearance.)

28. CAT-HEAD

CAT-Head offers a bridge view through the use of a head-mounted display and head tracker with a motion sensor. It allows novice OODs and Contact Coordinators to practice making maneuvering decisions in open ocean situations. This product is similar to SurfCAT except CAT-Head uses a head-mounted display that allows the user to visually track moving contacts using head movements. On the display, the following information is provided: ownship course, speed, and true bearing.

There are three keyboard controls: **SPACEBAR**, **ENTER**, and **TAB**.

SPACEBAR toggles the binoculars on and off.

ENTER re-centers the view on bow centerline.

TAB brings the view right-side up.

Note: CAT-Head is an experimental version at this time, which is in current use at one submarine training site.

29. PC PLOTS

PC Plots was developed to eliminate the need to author new SORAT scenario tapes to be used for training Extended Time Bearing (ETB), Geo and Time Frequency (TF) plotting in the tactical plotting laboratories. It allows an instructor to construct new scenarios very quickly, by using SubScript. Using PC Plots, students can listen to the auditory reports of bearings, faired bearings, and frequencies related to tracked contacts to obtain the data needed to plot on the Geo, TF, or ETB plots. In addition, a Data Display Unit (DDU) is simulated (Figure 27).

PC Plots has two modes for Geo Plotting. The first is a plotting lab with dynamic "bug": PC Plots may be connected to the MK19 Mod19 plotter table via an interface box available in some plotting labs in order to dynamically drive the bug on each of the plotting tables. The second mode is a plotting lab on-board with no dynamic "bug": When the "bug" cannot be driven, paper plots may be printed and secured under the potting paper to represent the ownship track.

Refer to PC Plots User Manual for complete instruction on this trainer.

Figure 27. PC Plots

30. MOBOT

This simulates the maneuvering board used to create true motion, relative motion and velocity vectors for ships in a training exercise. Users can track contacts from observed relative movement data and determine maneuvers by determining actual motion and relative movement. The MoBOT Procedures and MoBOT User Guide documents can be found in **Start |Programs |SubSkillsNet| Docs** for instructions on using MoBOT.

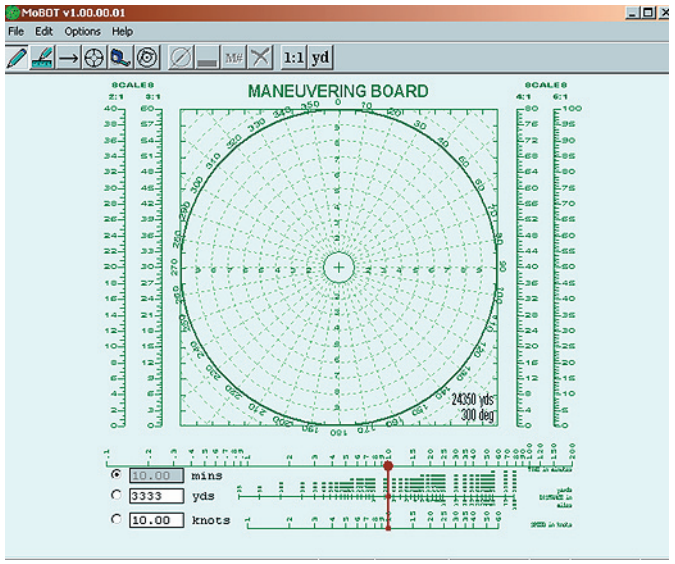

Figure 28. MoBOT

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